APPENDIX B

RESPONSIVENESS SUMMARY
RECORD OF DECISION

OUTBOARD MARINE COMPANY/WAUKEGAN COKE PLANT
SUPERFUND SITE

WAUKEGAN, ILLINOIS

September, 1999

RESPONSIVENESS SUMMARY

OUTBOARD MARINE COMPANY/WAUKEGAN COKE PLANT SUPERFUND SITE WAUKEGAN, ILLINOIS

1.1 Introduction

This responsiveness summary presents responses to comments provided by the public on the proposed plan for the Waukegan Manufactured Gas and Coke Plant Site (WCP Site) in the City of Waukegan, Illinois. Comments were received from the following parties:

Judy Beck
William K. Graham
Elgin Joliet and Eastern Railway Company
Outboard Marine Corporation

Comments will be repeated verbatim and in italic where the comment is short and direct. Where comments are lengthy they are summarized. The complete text of comments is available in the Administrative Record located in the Waukegan Public Library, 128 North County Street, Waukegan, Illinois and U.S. EPA Region 5 Records Center, 77 West Jackson Blvd., Chicago, IL 60604. Following the comment, U.S. EPA's response is presented. Comments are organized by each commentator.

1.2 Judy Beck

1. *The fish advisory in the Proposed Plan Fact Sheet could be misleading to the public because fish are contaminated with PCBs in addition to arsenic. I am assuming that the arsenic is "in addition to".*

The proposed plan summary of human and ecological risks (PP, pg. 3) states that there is a risk to human health from eating fish from the lake or the harbor because they may contain small amounts of arsenic. The commentator is correct in assuming that any risk from PCBs is in addition to the risk from arsenic that is a result of the WCP site.

2. *What amounts of contamination would be released to the lake in alternative #3?*

The release of contaminants to the lake will be reduced by at least 40 to 80% from the existing amounts (FS, pg. 5-8). The mass discharge of contaminants to the Longshore Current Zone of Lake Michigan under Alternative 3 is conservatively estimated at 31 kg/day ammonia, 5.9 kg/day phenols and 0.3 kg/day arsenic (FS, Table 5-D-6).

3. *What limits are in place for surface water in the harbor?*

Harbor surface water quality criteria are ammonia - 15 mg/l, arsenic - 0.148 mg/l and phenols - 0.1 mg/l.

1.3 William K. Graham

1. The commentor requests that U.S. EPA apply a decision tool similar to that provided in the attached paper which proposes quantitation of risk for occupational fatalities. Based on this methodology the commentator states that there is a probability of at least one in ten of a fatality in connection with construction of the proposed remedy. In addition nonfatal injuries for construction activities at a remediation site would add to site construction risks. The commentator states that these facts can be used to demonstrate to the public that the proposed remedy is not technically feasible and that it is U.S. EPA's legal obligation to fairly communicate risks to the public.

U.S. EPA Response: U.S. EPA has used similar methods of estimating construction-related risks from site remediation at sites where large scale excavation or capping is proposed. The risk of death and injuries as well as traffic related deaths and injuries were estimated for the Onalaska Superfund site (Onalaska Municipal Landfill Superfund Site, Onalaska, Wisconsin, Feasibility Study, 1994). The excavation and cover for the proposed remedy for the WCP site is not of such a large scale as the Onalaska site or the example site used in the referenced paper. The excavation volume of the WCP proposed remedy is only 5% of the example site excavation volume (26,600 cys, at most, compared to the example site excavation volume of 484,000 cys.). Likewise the proposed remedy cover involves placement of only 12 % of the soil necessary for the example site cap (17,200 cys for the phytoremediation cap versus 145,000 cys for the example site RCRA cap). Prorating the paper's estimated risks downward for the much smaller quantities of the proposed remedy results in a risk of 0.008 (1 in 125) for a fatality from excavation and 0.0014 (1 in 714) for a fatality from construction of the phytoremediation cap.

U.S. EPA recognizes that construction risks should be considered and includes that evaluation under the Short-term Effectiveness- Protection of Remedial Workers and Protection of Community evaluation criteria. U.S. EPA however has used its judgement in not requiring detailed calculations of construction-related risks be performed for the WCP site because of the relatively small volumes of soil to be remediated and the relatively small volume of soil for the phytoremediation cap. In summary, the expected construction-related risks are not sufficient to require detailed calculations and are not sufficient to rate the alternative as technically infeasible.

2. *The site environs may qualify under U.S. EPA guidelines under the Environmental Justice policy. It would be wholly inappropriate to take expeditious shortcuts in the decision process which clearly put at risk the members of this community.*

U.S. EPA's response to Mr. Graham's first question showed that because the quantities of excavated soil are considerably less than those presented in the referenced paper, the WCP site risks would also be much less than those presented by the paper and quoted by the commentor. Prorating the estimated risks for off-site traffic related accidents downward for the much smaller excavation volume of the proposed remedy results in a risk of 0.0028 (1 in 364) for an off-site traffic related fatality (compared to the 1 in 20 risk stated by the commentator). As discussed above, U.S. EPA considered the risk to the community under the Short-term Effectiveness-Protection of Community evaluation criteria during the evaluation of the remedial alternatives. U.S. EPA believes the proposed alternative offers the best balance of all the evaluation criteria, and this evaluation is not dependent on whether the community is designated as an Environmental Justice community.

1.4 Elgin Joliet and Eastern Railway Company

1. EJ&E protests that counsel for U.S. EPA informed it that it would not receive special notice for remedial investigation of the Waukegan Coke plant site, but that U.S. EPA's Project Manager for Remediation informed it that it would receive special notice for remediation of the site. EJ&E further protests that there is no basis for naming it as a potentially responsible party for the site.

U.S. EPA Response: EJ&E owned the site from 1893 to 1927. During part of this time, Chicago Tie and Timber Company operated a creosote wood-treating plant on the property, which is the source of the current creosote-contaminated soils on the site. As such, EJ&E is liable as an owner under Section 107 of CERCLA. The fact that EJ&E did not receive special notice for the remedial investigation in no way precludes it from receiving special notice for remediation of the site. If and when U.S. EPA provides special notices to the PRPs for the Waukegan Coke Plant site, the U.S. EPA will follow the special notice procedures in Section 122(e) of CERCLA.

2. *The CT&T wood-treating operations were not consequential contributors to the reported groundwater contamination.*

While the aqueous discharges from the manufactured gas and coke operations are believed to be a major source of the ground water contamination, U.S. EPA disagrees that other sources such as natural flushing of soil contamination from the wood treatment operations are insignificant contributors to ground water contamination.

3. *The CT&T wood-treating facility operations are not associated with the PAH and arsenic contaminated soils proposed for excavation.*

U.S. EPA does not dispute this assertion except that the PAH contaminated soil located 100 feet southeast of Slip Number 4 (the area surrounding borings SB-26 and SB-27) may be associated with creosote wood treating operations. This is because the Lake Michigan beach line position

may have been east of this location in 1926 (see FS figure 2-3), the year EJ&E sold the site to North Shore Coke and Chemical Company. As a result this area could have been used for creosote treated wood storage or disposal of creosote sludge.

4. *There is no evidence in the record that the contaminated soil removed from Slip Number 4 was contaminated with creosote rather than coal tar.*

The CT&T wood treating plant buildings and tanks were located immediately adjacent to the soil excavated from Slip Number 4 (see RI figure 3.1-1). The soil contaminants in the creosote soil area are similar to those expected from creosote. These two facts make it most likely that the soil designated as "creosote soil" presently in the designated soil storage area is contaminated from CT&T operations. See response to comment 3 above relative to the PAH contaminated soil southeast of the slip.

5. *The risk assessment results presented in the Proposed Plan do not support the conclusion that the contamination presents a health hazard that requires active remediation.*

The risk assessment results are presented in the Final Technical Memorandum Waukegan Manufactured Gas and Coke Plant Site Human Health Risk Assessment, November 14, 1995. The estimated risks for the exposure pathways evaluated are presented in Table 3 of this ROD. For the occupational and utility worker scenarios considered to be the reasonable future uses of the site, cancer and/or non-cancer risks exceeded the allowable risk of $1x10^{-4}$ and HI of one. The contaminants most often contributing to the risk are PAHs and arsenic. This supports U.S. EPA's conclusion that health hazards require remediation at the WCP site. In addition, ground water standards, and potentially surface water standards, are being exceeded as a result of contamination at the WCP site.

6. *The Remedial Action Objectives are overly cautious or are addressed by alternatives that are overly aggressive, based on site risks. Remedial Action Objectives that allow the use of a "Limited Action" alternative that includes institutional controls should be seriously considered.*

The remedial action objectives for soil included protection of human health from soil with concentrations of contaminants representing an excess cancer risk of 1×10^{-6} as a point of departure. The proposed remedy includes excavation of PAH and arsenic contaminated soil that exceeds 1×10^{-5} excess cancer risk using the representative high exposure (RHE) utility worker exposure. The more conservative 1×10^{-6} risk level, the more conservative reasonable maximum exposure (RME) assumptions and the more conservative residential land use exposure assumptions were not used in defining the areas for more costly remediation. U.S. EPA believes the exposure levels and exposure assumptions used in identifying the areas for active remediation are reasonable given the potential for future site use.

A "Limited Action" alternative that includes institutional controls would be only marginally

more protective than the "No Action" alternative considered. A "Limited Action" alternative would not allow future site development, would not address continued contaminant flushing to the groundwater, would not address continued contaminant discharge to the lake and harbor and would not meet the groundwater objective of minimizing migration and reducing the area of impact as required by the U.S. EPA technical impracticability guidance (see FS pg. 3-12).

1.5 Outboard Marine Corporation

OMC provided comments in: 1) a cover letter dated April 23,1999, 2) un-numbered text in an attachment to the cover letter, and 3) in numbered comments included in the attachment under the heading "Additional Comments." Responses are organized according to each format.

1.5.1 OMC Comments in Letter Dated April 23, 1999

1. OMC April 23,1999 Letter, pg. 1, par.1. The commentor questions U.S. EPA's ability to designate the site as an operable unit of the adjacent NPL Waukegan Harbor Superfund site, without meeting the statutory and regulatory requirements for listing an NPL site.

U.S. EPA Response: The National Contingency Plan (NCP) defines operable unit as "a discrete action that comprises an incremental step toward comprehensively addressing site problems....Operable units may address geographical portions of a site, specific site problems, or initial phases of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of a site." 40 C.F.R. § 300.5. The NCP states U.S. EPA's support of the operable unit concept as an efficient method of achieving safer and cleaner sites more quickly while striving to implement total site cleanups. 55 Fed. Reg. 8705 (March 8, 1990).

PCB contamination was discovered at the Waukegan Harbor Superfund site in 1975, and on September 8, 1983, the site was placed on the National Priorities List (NPL) (48 Fed. Reg. 40658.) As part of the remediation for that site, additional contamination was discovered on the Waukegan Coke Plant site, which is contained entirely within the Waukegan Harbor Superfund site. OMC currently owns both the Waukegan Harbor Superfund site and the Waukegan Coke Plant site. While it is true, as the commentor asserts, that the contamination at the Waukegan Coke Plant site was caused by activities different from those that gave rise to the PCB contamination at the Waukegan Harbor Superfund site, this fact does not preclude an operable unit designation. A site's boundaries are the extent of the contamination. The Waukegan Coke Plant site addresses specific contamination that requires remediation as a necessary step to the remediation of the entire Waukegan Harbor Superfund site, and its operable unit designation is therefore in accordance with the NCP.

2. OMC April 23,1999 Letter, pg. 1, par. 2. The commentor states that the contamination at the site arises from and is associated with a wood-treating plant, the production of manufactured gas

and the production of coke by parties owning or leasing the site prior to OMC's ownership. Further, the data indicate and the investigation and proposed plan recognize that the substantial majority of the contamination of concern that necessitates and drives the Proposed Plan was released during the manufactured gas plant operations over fifty years ago.

U.S. EPA Response: The manufactured gas plant operations were a major source of the current soil and groundwater contamination. Substantial soil and groundwater contamination that requires remediation was also contributed by the wood-treating plant and the coke plant. As an example, the creosote contaminated soil from the wood-treating plant is included for remediation in the proposed remedy.

3. OMC April 23,1999 Letter, pg. 2, par. 2. There is a significant potential to redevelop properties such as the site which has the unique advantage of being both lakefront and on the harbor.

U.S. EPA Response: U.S. EPA agrees with the commentor that this site has unique geographical advantages. To maximize these advantages, U.S. EPA has stressed remedy flexibility to accommodate future use considerations throughout the remedy selection process. U.S. EPA fully supports putting sites back into use and recognizes the importance of obtaining a broad base of input when making future use determinations. For this reason, U.S. EPA had discussions with current and past owners and operators, members of the local community (through the Waukegan Community Advisory Group), local business owners, the State and members of local government to solicit input on reasonable anticipated future use at this site.

4. OMC April 23,1999 Letter, pg. 2, par. 3. The commentor strongly believes that the proposed plan does not sufficiently evaluate the historic operations, and consequently, does not adequately characterize the nature, extent and impact of the historic contamination. Without further investigation and evaluation of additional information, appropriate response options cannot be identified or selected.

U.S. EPA Response: Substantial effort has been undertaken to acquire site history information and investigate the site. The remedial site investigation was conducted in 2 phases beginning in February 1992 and continuing through 1996. Additional site investigation and treatability testing has been conducted throughout the FS. U.S. EPA reviewed the additional historical information provided by the commentor and has found that it does not change the major components of the proposed remedy. Some additional investigation may, however, be warranted. Because U.S. EPA does not want to further delay remedial action at this site, any additional site investigations that are found to be needed will be added to the already identified preliminary Design Investigations. The results of additional investigations will be summarized in the Preliminary Design Report.

5. OMC April 23,1999 Letter, pg. 3, par. 1. The commentor contends that finalizing the

Proposed Plan at this time is inappropriate because there is need to further investigate and evaluate technical and land use issues.

U.S. EPA Response: See response to comment 4 above relative to the need to further investigate the site. With regard to land use issues, considerable effort was expended in evaluating the future land use of the site. As stated in comment 4, input was solicited from current and past owners and operators, members of the local community (through the Waukegan Community Advisory Group), local business owners, members of local government and Illinois EPA. Although a residential scenario was evaluated in the Baseline Risk Assessment, based on discussions regarding future land use and numerous other physical factors, the reasonable anticipated future use has been identified as industrial. Some of the physical factors that were considered in making future use determinations include: 1) the fact that site has been located in an industrial corridor for the past 100 years and there are no current plans in process to change that designation, 2) there are current industrial/commercial operations both directly north and south of the site, 3) there are ongoing discussions of expansion by adjacent businesses onto portions the site, 4) the proximity of three PCB containment cells that will be required to be managed in-perpetuity, and 5) the long-term ground water cleanup requirements. The FS Appendix 3A has a discussion of Future Land Use Considerations.

6. OMC April 23,1999 Letter, pg. 3, par. 2. The commentor requests that:

a) *Further site investigations be undertaken and that the RI be supplemented and amended.* See response to comment 4.

b) *The FS be revised and amended to consider the new site investigation information as well as the information presented herein.* Any new site investigation data collected will be performed as part of Preliminary Design Investigations and documented in the Preliminary Design Report.

c) *The City of Waukegan, the citizens advisory groups and OMC be consulted with respect to any impacts from the proposed plan or any additions or revisions thereto on long term site redevelopment options and revitalization plans.* U.S. EPA has conducted discussions and made presentations to representatives of the City, OMC and the Citizens Advisory Group on the remedy. U.S. EPA is committed to an ongoing dialog on mitigating concerns regarding potential impacts from remedy implementation.

d) *The comment period be extended.* The comment period was extended 30 days at the request of OMC and the Waukegan Citizen's Advisory Group. Further extension of the comment period would excessively delay implementation of the remedial action.

e) *That a revised proposed plan be submitted for public review and comment.* A revised proposed plan is not needed because substantial modifications to the proposed remedy have not been found to be warranted and any additional investigations will be conducted as part of the Preliminary Design.

1.5.2 OMC Comments in Attachment A to Letter Dated April 23, 1999

1. OMC Attachment A, pg. 1, bullet 1 and pg. 2. Understanding of Historical Operations.

U.S. EPA has not obtained sufficient information on historic operations at the site, which is needed to ensure that the remedy is appropriate. In particular we believe it is especially important that additional historic operations information be obtained for each of the four distinct periods of site operations-pre-coke plant operations, coke plant operations prior to thionizer building removal, coke plant operations after thionizer building removal, and post-coke plant activities. The U.S. EPA should conduct further investigations to more fully characterize historic manufacturing activities and source areas. In particular the commentator states that the most likely source of arsenic at the site is the arsenic trioxide used in the coke plant thionizer building.

U.S. EPA believes that more information on site historic operations is not needed at this point to support making a remedy decision. The primary purpose of additional site historical information would be to better refine the current understanding of the original source concentrations and the degree of dilution that has occurred as the plume has migrated. Even if historical information were available to accurately determine initial arsenic trioxide, phenol and ammonia concentrations released to the soil or ponds, there would continue to be large uncertainties regarding the quantities discharged. As a result, the additional historic information would only marginally improve the current understanding of plume migration. Also, better understanding of plume migration is not central to determining either the need for remediation or the type of remediation. Sufficient information on the current nature and extent of contamination is available to proceed with the preliminary design of the proposed plan. The area of soil and groundwater contamination has been defined with an extensive sampling program. Additional pre-design sampling will be required, but it is not necessary to halt the remedy decision process.

The main purpose of additional historic information would be to better determine the degree of responsibility of the PRPs. Given the fact that further delays in the remediation of the site would likely result in only a marginal improvement in understanding plume migration, and the fact that better understanding plume migration is not critical to determining the need for site remediation or remedy selection, U.S. EPA sees little value in further delaying the remedial action in an attempt to collect additional site historic information.

2. OMC Attachment A, pg. 1, bullet 2 and pg. 3. Redevelopment Issues.

Although the Proposed Plan purports to facilitate the future redevelopment of the site, neither the Feasibility Study or the Proposed Plan identify or provide possible solutions to obvious soil and water quality concerns. This is a highly critical area which should be thoroughly analyzed in the Feasibility Study and become a major factor in development of the proposed remedy. Redevelopment issues which need to be addressed include possible high-density residential use,

future constructability, infrastructure maintenance and construction, and storm water management.

Considerable effort was undertaken to evaluate potential future land use for the site; input was solicited from current and past owners and operators, members of the local community (through the Waukegan Community Advisory Group), local business owners, members of local government and Illinois EPA. Although a residential scenario was evaluated in the Baseline Risk Assessment, based on discussions regarding future land use and numerous other physical factors, the reasonable anticipated future use has been identified as industrial. Some of the physical factors that were considered in making future use determinations include: 1) the fact that site has been located in an industrial corridor for the past 100 years and there are no current plans in process to change that designation, 2) there are current industrial/commercial operations both directly north and south of the site, 3) there are ongoing discussions of expansion by adjacent businesses onto portions the site, 4) the proximity of three PCB containment cells that will be required to be managed in-perpetuity, and 5) the long-term ground water cleanup requirements. Future constructability will be more difficult in the area of solidified arsenic contaminated soil.

The excavation and off-site disposal for the arsenic soils (Alternative 3B) was considered but added greater costs and increased short term impacts from the off-site transport of the contaminated soil. The construction cost of on-site solidification is $691,000 (FS Table 5-C-17) while the cost for excavation and off-site disposal is $1,100,000 (FS Table 5-C-20). These considerations were judged to be more significant than limitations on future construction in the one-half acre area of solidified arsenic soil. A soil management plan for the proper management of soils excavated during future site activities will be developed as part of the remedial design of the proposed remedy. U.S. EPA believes the remedy decision provides enough flexibility to accommodate future use.

The disposition of groundwater and soils that are generated during maintenance of the existing utilities or the construction of new utilities or structures will be addressed in the site soils management plan to be developed as part of the remedial design. The commentor's recommendations for handling shallow contaminated groundwater via reinfiltration will be considered in the soils management plan. The creation of uncontaminated utility corridors through the site will also be considered during the soil management plan development. This concept appears, however to have limited advantages because the PAH areas of unacceptable risk to utility workers will be removed and the arsenic areas will be solidified. A utility corridor through the arsenic solidification area could be considered in the soil management plan. Storm water management under future site development will also be included in the soils management plan. Storm water will not be allowed to reinfiltrate the groundwater because an objective of the proposed remedy is to minimize infiltration.

3. OMC Attachment A, pg. 1, bullet 3 and pg. 5. Infiltration/Recharge and Soil Cap.

The soil cap proposed for the site does not appear to be appropriate. The Feasibility Study and the Proposed Plan state that the purpose for capping the site following completion of the active soil remediation is to minimize infiltration and prevent exposure to marginal zone soils. While we agree that there appears to be some merit in preventing exposure to marginal zone soils, it is not clear to OMC that infiltration should be minimized, or that the proposed cap will significantly minimize infiltration. We also did not find adequate technical support that would justify the effectiveness of the proposed phytoremediation cap in eliminating direct human exposure.

Much of the comment regarding infiltration and recharge is questioning the need to reduce infiltration. A remedial action objective for groundwater was developed in Section 2 of the FS to protect surface water quality by reducing the driving forces for groundwater migration at the site. This objective was developed in concert with an objective to reduce the contaminant mass or concentration within the plume. These objectives are necessary for the WCP site because minimizing migration and reducing the area of impact are required by U.S. EPA when attainment of MCLs is technically impracticable (see FS pg. 3-12). A remedial objective for soil was also developed to protect the environment by minimizing/eliminating the migration of contaminants in the soil to groundwater or to surrounding surface water bodies. Reducing infiltration through the site addresses both of these objectives. It reduces leaching of contaminants in the marginal zone soils that will remain on-site and it reduces the hydraulic gradient and thus the mass flux of contaminants from the site.

It is true that reducing infiltration through the cap will reduce the supply of oxygen to the groundwater (attachment A, pg. 5, bullet 1). However the mass of oxygen supplied via infiltration is estimated to be only one thirteenth of the gaseous oxygen diffusion from the vadose zone to groundwater (see FS Appendix 2G, pg. 2-G-1). As a result the reduced oxygen supply to the groundwater by reducing infiltration will be relatively insignificant at the WCP site.

The commentor makes the point that the area of greatest infiltration is the beach area and that this area is not proposed for capping (attachment A, pg. 6, bullet 1). This area is not proposed for capping because of the obvious negative aesthetic impacts this would have for the public beach. This area of groundwater contamination however is addressed through the active groundwater collection and treatment system for this area in the proposed remedy.

The commentor states that eliminating infiltration on the site results in a shift of the groundwater divide and an increase in contaminant mass flux to the harbor, which is contrary to the goal of the cap (attachment A, pg. 6, bullet 2). The remedial goal is to reduce contaminant migration to the harbor and the lake. While a shift of the groundwater divide to the east changes the direction of contaminant migration for a portion of the plume, the net effect of the reduced gradient is to reduce the annual mass flux of contaminants to the lake and harbor. Because the area around the groundwater divide is the area to be actively collected and treated, the movement of the divide eastward does not increase the mass flux of COCs to the harbor (see FSD Figures 5D-17, 5D-20 and 5D-23).

The commentor states that the small changes in hydraulic gradient between no cap alternatives and "0%" infiltration cap do not imply significant changes in contaminant flux to surface water bodies (attachment A, pg. 6, bullet 3). The small changes in gradient presented by the commentor reflect a decrease in gradient of between 13% and 31%. U.S. EPA believes these are significant decreases and that, in conjunction with the reduced leaching of contaminants to groundwater resulting from infiltration reduction, the benefit of reduced infiltration is warranted. The modeled effect of eliminating infiltration on the mass flux of COCs to surface water can be seen by comparing the mass fluxes of COCs presented in the Feasibility Study Figures 5D-15 to 5D-24. These figures present the mass fluxes for ammonia, arsenic and phenols to the lake, breakwater area and the harbor for alternatives 1, 2 and 3. For alternative 3, a 50% reduction in infiltration and a 100% reduction in infiltration assumption are presented. While large decreases in mass flux on the order of 50% are seen between alternative 1 (100% of current infiltration) and alternative 3 (0% infiltration), much of the reduction is a result of the groundwater collection and treatment system. The effect of reduced infiltration alone can be judged by comparing the alternative 3 (0% infiltration)and the alternative 3 (50% infiltration). Based on this comparison it appears that the reductions in mass flux from infiltration reduction alone are comparable to the 13 to 31 % range in the hydraulic gradients presented by the commentor. U.S. EPA considers this to be a significant reduction in mass flux.

The commentor states that the SLAEM model underestimates groundwater flow from the north because it assumes the foundations of the east end of OMC Waukegan Plant 2 acts as a barrier to groundwater flow when they are actually not significant flow barriers (attachment A, pg. 6, bullet 4). Previous information provided to the modelers indicated that these foundations were completed to the till. However, U.S. EPA does not believe the model significantly underestimates groundwater flow from the north because the simulated piezometric head and observed heads compare well at locations in proximity to OMC Waukegan Plant 2 (see FS Figure 2-B-3, 2-B-5 and 2-B-7).

The commentor states that the conceptual model does not appear to account for groundwater recharge to the peninsula that would come from the west under the OMC Waukegan Plant 2 site (attachment A, pg. 7, bullet 1). The area west of Waukegan Plant 2 was modeled and the model showed that groundwater from the area west of plant 2 would not flow onto the site (see FS Figures 2-B-1, 2-B-2, 2-B-4 and 2-B-6). Much of the recharge ends up discharging to the harbor. The simulated piezometric head and observed heads compare well at locations in proximity to OMC Waukegan Plant 2 (particularly OMC well 6 and MW-11S).

The commentor questions the need to reduce infiltration because it only provides an added safety factor for protection of surface water (attachment A, pg. 7, bullet 2). U.S. EPA believes reducing the mass flux through infiltration reduction is a necessary component to meet the overall remedial objectives including those of minimizing migration and reducing the area of groundwater impact. U.S. EPA does not believe additional modeling is necessary for the WCP site as part of the remedy selection process.

The commentor provides additional comments on the phytoremediation cap on pages 6 and 7 of Attachment A. The commentor expresses concern that 6 inches of cover soil for controlling direct contact exposure may not be sufficient. The concern is expressed that the areas proposed to be covered do not exceed direct exposure risk levels and therefore the cover may not provide remediation benefits. The commentor expresses the preference for a soil cover cap over only the remediation and marginal zone soils and suggest that 3 feet of clean soil be used. U.S. EPA believes that the 6 inches of cover soil with a vegetative cover is adequate to prevent direct contact exposure. Site maintenance will be important in assuring that areas of sparse vegetation are corrected and that adequate cover is present throughout the winter months. The marginal zone soils do exceed the 1×10^{-6} excess cancer risk level for boat workers and trespassers. In addition the entire area is to be covered to reduce infiltration and the contaminant flux to the harbor as discussed earlier.

4. OMC Attachment A, pg. 1, bullet 4 and pg. 8. Soil Remediation Areas.

The soil remediation areas do not appear to be properly defined. The areas for active remediation do not appear to correlate to the analytical data, and the remediation areas do not take into account data previously provided by OMC to the U.S. EPA. In addition, the creosote impacted soils are not adequately addressed.

U.S. EPA agrees that additional information and alternative development needed to be provided for the creosote soils (attachment A, pg. 8, item 1). A FS Addendum has been developed to address these issues and has been added to the Administrative Record.

The commentor expresses concern over the area of overlap of arsenic and PAH remediation (attachment A, pg. 8, item 2). The overlap area is very limited in extent (about 50 feet in diameter). Issues related to the ability to treat PAH soils with elevated arsenic will be investigated as part of remedial design. The need for further characterization of the leachability of arsenic from the arsenic remediation area soils will also be evaluated during remedial design.

The commentor states that parking lot expansion data that OMC collected was not used in determining the arsenic remediation area (attachment A, pg. 9, item 3). The maximum arsenic concentration from the OMC data from the proposed parking lot expansion presented as an attachment to the OMC comments is 102 mg/kg. This is below the 1×10^{-5} RHE for a utility worker of 940 mg/kg used as the arsenic level for solidification in the proposed remedy.

The commentor states that the arsenic remediation zone depicted on Figure 4-1 does not accurately reflect the arsenic concentrations measured at the site (attachment A, pg. 9, item 4). It appears that the commentor may have used the 1×10^{-6} RHE for a utility worker of 94 mg/kg presented on table 3-3, rather than the stated 1×10^{-5} RHE (see FS pg. 4-5, par. 3) of 940 mg/kg for identifying the arsenic remediation area.

The commentor states that the PAH remediation zone depicted on Figure 4-1 does not correlate with the 100 mg/kg isopleth line depicted on Figure 2-6 (attachment A, pg. 9, item 5). The soil concentration defining the PAH remediation area is not 100 mg/kg total PAH. As stated in the FS

Section 4 (FS pg. 4-5) the PAH remediation area is defined by the 1 x 10^{-5} RHE for utility workers. The soil cleanup levels range from 116 mg/kg to 1,160 mg/kg for individual carcinogenic PAHs. The area depicted on Figure 4-1 accurately depicts the soils exceeding these values.

The commentor states that additional investigations will be necessary to define the southern limit of PAH contamination on their property immediately north of Plant 1 and requests that efforts be undertaken to minimize disruptions to their operations (attachment A, pg. 9, item 6). U.S. EPA will take the comment into consideration during preliminary design investigations and remedial construction activities.

5. OMC Attachment A, pg. 2, bullet 1 and pg. 9. Extent of Groundwater Impacts and Groundwater Remediation.

The groundwater impacts are not adequately defined, particularly to the south of the site, and preferential flow pathways need to be investigated. In addition, we believe that in-situ groundwater remediation technologies were inappropriately excluded from consideration in the FS and that in-situ remediation technologies can be effectively utilized at the site. Specifically in-situ bioremediation could well be used in conjunction with biosparging to stimulate in-situ aerobic bioremediation of organic compounds. These technologies would be much less costly than the proposed groundwater remedial approach and would help to maximize the future redevelopment and use of the site.

U.S. EPA agrees that the extent of the groundwater plumes below OMC Plant 1 and further south toward the City of Waukegan Water Treatment Plant have not been fully defined (attachment A, pg. 9, item 1) and will require additional sampling during the Remedial Design. However the concentrations in this area are clearly below the concentration levels targeted for active groundwater collection and treatment. Because the need for additional investigations in the area of OMC Plant 1 will not materially impact the remedy decision, it is appropriate to evaluate this during the remedial design.

The commentor believes additional investigations north of the site need to be undertaken based on arsenic and benzene found in deep groundwater at the southeast corner of OMC Plant 2 (attachment A, pg. 10, item 2). The arsenic and benzene concentrations in the deep groundwater are similar to concentrations in MW-14 located in the beach area east of Sea Horse Drive about 300 feet east of the Plant 2 UST. However the chlorinated organics in groundwater at the UST (vinyl chloride, chloroethane, 1,1, dichloroethane, cis-1,2 dichloroethene and toluene) are not consistent with WCP site contaminants. The need for additional delineation of the northern extent of groundwater contamination will be evaluated as part of the remedial design.

The commentor believes the FS needs to provide a discussion of whether preferential flow pathways have affected migration of contaminants in the subsurface (attachment A, pg. 10, item 3). Preferential flow pathways were considered during the RI. Preferential flow paths were not found to be significant features affecting migration of groundwater contaminants. Infiltration of

contaminated groundwater to the storm sewer that drains to the harbor can be further evaluated during remedial design.

The commentor believes that in-situ remediation of groundwater technologies were inappropriately excluded from consideration in the FS (attachment A, pg. 10, par. 4). Specifically the commentor believes either in-situ bioremediation through use of ORCs or air sparging, or biosparging with vertical circulation wells, would be less costly than the proposed approach and help maximize future redevelopment of the site. These technologies were screened out because of the need for considerable dilution of the contaminants to avoid toxicity effects to the microorganisms aerobically degrading the phenol, benzene and ammonia. Specifically, ammonia degradation even with substantial dilution would be difficult to obtain at WCP site. Dilution of the high concentrations in the deep groundwater with the lower concentrations of the shallow was considered but rejected because sufficient groundwater for dilution to the necessary degree is not available in all the target areas and even with dilution, ammonia degradation may not occur. In addition to these concerns, in-situ bioremediation would not treat the arsenic contamination that is one of the main COCs discharging to the lake and harbor.

The commentor believes in-situ treatment of arsenic could be performed. U.S. EPA is unaware of any full scale system that has been installed to treat arsenic throughout a groundwater plume (attachment A, pg. 11, par.2). In-situ treatment of arsenic would involve injection of chemicals into the subsurface to precipitate the arsenic. Because of the experimental nature of in-situ arsenic treatment, considerable time and resources would need to be expended to determine whether it is a viable technology prior to proceeding with design. Because of this and the availability of feasible and cost effective ex-situ treatment technologies, U.S. EPA does not agree that in-situ arsenic treatment should be evaluated further.

The commentor believes the proposed groundwater remediation plan does not adequately address the southern portion of the groundwater plume (attachment A, pg. 11, par.3). As discussed previously, U.S. EPA will evaluate the need to further characterize the southern extent of the plume as part of the remedial design activities. If needed, additional long-term monitoring to support natural attenuation for this portion of the plume may be required.

The commentor states that the impact of the proposed groundwater remedy on the beach and OMC property was not discussed in the FS and that the FS should be revised to include such an evaluation and that the impact should be contrasted against less intrusive in-situ treatment methods (attachment A, pg. 11, par. 4). The impact of the proposed remedy on the use of the beach and the OMC property is minimized by the use of a treatment cell concept. This method ties up only small areas of the beach or OMC property at any one time so that the effect on land use is minimized. Further evaluation of the effect on beach or OMC property use in the FS is not considered essential and would further delay site remediation. In-situ treatment methods were previously discussed and are not considered viable for the WCP site.

The commentor states that the FS did not evaluate the form of arsenic in groundwater and the risks posed to human health and ecological receptors and arsenic's impact on the remedy

(attachment A, pg. 12, par. 1). U.S. EPA evaluated the human health impacts of arsenic in the Final Technical Memorandum, Waukegan Manufactured Gas and Coke Plant Site Human Health Risk Assessment, November 14, 1995. An acute lethal risk was identified for ingestion of arsenic contaminated groundwater on-site. There may be some differences in toxicity between trivalent and pentavalent forms of inorganic arsenic (trivalent may be slightly more toxic), but convention has been to assume that they are equitoxic when performing a risk assessment since the differences in potency are small and the forms tend to be interconverted in the environment as well as in the human body (ATSDR Toxicological Profile for Arsenic, 1993). For the fish ingestion assessment, the differences in toxicity between organic arsenic and inorganic arsenic was factored in because organic arsenic is not carcinogenic. In both animals and humans, arsenate (As+5) is reduced to arsenite (As+3) which is then methylated to organic forms of arsenic.

Ecological risks were evaluated in the Final Technical Memorandum, Waukegan Manufactured Gas and Coke Plant Site Screening Ecological Risk Assessment. Arsenic was not retained as a COC for ecological risks because ecological receptors are not exposed to groundwater and arsenic is not present, or projected to be present in the future, in surface water at concentrations exceeding surface water quality criteria for aquatic life. The FS includes remedial objectives addressing the arsenic groundwater contamination as well as the other COCs. The dissolved arsenic in the groundwater will be treated to discharge standards using metals precipitation. The form of arsenic will be evaluated as part of remedial design if the form is determined to be important for selection of the method of precipitation or the dose of added chemicals.

The commentor believes that the FS is not clear on the rationale used to define groundwater remediation (attachment A, pg. 12, par. 3). Groundwater remedial objectives are discussed in the FS Section 3.3 and include objectives to prevent exposure, minimize migration, and reduce the area of impact of groundwater contamination. The groundwater treatment remediation zone selection is discussed in Section 4.3.2.1. of the FS. The target zone was selected as the 20 mg/l arsenic contour because this represented the area of highest arsenic, phenol and ammonia concentrations. Ammonia and phenol are important to target because they have the greatest potential to cause exceedance of surface water standards. Arsenic is included because it greatly exceeds the groundwater standard of 50 ug/l and is important relative to reducing the area of impact of groundwater contamination.

1.5.3 OMC Comments in Attachment A -Additional Comments

1. *Appendix 2-C of the FS presents an analysis of the effect of peninsular groundwater hydraulics on groundwater flow and chemical distribution. As part of this analysis, there is an assumption made that aqueous discharges from the site occurred from 1928 until site grading after building demolition in 1972. Given the information presented in the "Understanding of Historical Operations" section above, it is clear that the arsenic discharges at the site would have ended in approximately 1947. Consequently the analysis presented in Appendix 2-C needs to be redone to account for this shortened arsenic discharge period. OMC also questions the use*

of chloride as a conservative surrogate for the analysis, since the chloride source areas and discharge duration have not been identified.

U.S. EPA does not agree that the modeling documented in Appendix 2-C needs to be redone to account for different periods of discharge for arsenic compared to other site contaminants. The purpose of this modeling was to evaluate whether the observed stratification in the plume was explainable by groundwater hydraulics and to evaluate the effect of beach accretion and other site changes on groundwater flow patterns. The overall conclusions of the modeling were of a very general nature. The model was not run for arsenic specifically and re-running the model for arsenic would not change the overall conclusions that: 1) stratification is explainable by groundwater hydraulics, 2) the groundwater discharged in the past through the present dunes area, 3) movement of the beach eastward has enhanced attenuation of the plume and 4) the plume discharges within 250 feet of the shore. In addition these conclusions do not have a large effect on either the need for groundwater remediation or the design of the groundwater remediation system.

2. *Appendix 3-C of the FS presents the process used to calculate the target soil concentration (TSC) for arsenic for protection of groundwater. A 25 mg/kg value is calculated as the site-specific TSC. We believe this value is too restrictive- the Tier 1 value provided in the Illinois TACO regulations, which is pH dependent, ranges from 25 to 31 mg/kg for Class I groundwater. The calculated mean pH for the available surface soil data is 7.8 +/- 1.3; this corresponds to an arsenic cleanup objective of 31 mg/kg, which would be more appropriate TSC. This issue needs to be evaluated in the FS.*

U.S. EPA believes the method used to develop an arsenic TSC for protection of groundwater is more accurate than the method using soil pH alone. The method used is site-specific and thus takes into account the inherent variability in soil geochemistry. Also the difference in results of the methods are relatively minor.

3. *The remedy proposed under Alternative 3 effectively eliminates the groundwater ingestion pathway (i.e., the remedy will satisfy all the criteria for eliminating the groundwater ingestion exposure route under the Illinois TACO regulations). Consequently, the soil cleanup objectives for protection of groundwater for arsenic or any other contaminants of concern do not need to be considered when determining remedial action objectives. We believe that the use of the arsenic soil cleanup objective for the protection of groundwater as a remedial action objective needs to be reevaluated in the FS.*

Source control is an essential element of remediation under CERCLA and the NCP. Control of further releases to the groundwater is an important remedial objective and is specifically listed within the U.S. EPA TI guidance (see FS Section 3.3).

4. *Within the Proposed Plan and the FS, there are several discussions regarding the contaminants of concern within the site groundwater. The listing of contaminants vary between discussions – for example, the Executive Summary of the Feasibility Study states that the*

impacted groundwater has elevated concentrations of arsenic, phenols and ammonia, while the proposed plan states that the major contaminants of concern within the groundwater are arsenic, benzene, phenol, thiocyanate and ammonia. The documents need to be revised to ensure that they are consistent and clear as to which contaminants within the site groundwater are considered to be a concern.

The FS Executive Summary and the Proposed Plan do not list all the contaminants of concern exceeding drinking water standards. The FS Executive Summary states that "the groundwater has elevated concentrations of arsenic, phenols and ammonia". This statement is not intended as a listing of COCs but as an executive summary of the most important contaminants relative to the FS. The Proposed Plan, under the subheading Remedial Investigation Results, states that "the major contaminants of concern are benzene, phenol, thiocyanate and ammonia". This is intended as a list of the most significant COCs found in the RI. As a result, the statements are not inconsistent.

5. *In Section 3.2.3 of the FS, there is a statement that the soil at the site is not a RCRA hazardous material. This statement is not correct – one of the waste characterization samples collected during the RI (sample TT2401) failed the TCLP for benzene (in addition it is more appropriate to refer to RCRA hazardous waste, not hazardous material). This portion of the text needs to be rewritten to reflect all waste characterization results, and should also discuss the U.S. EPA guidance related to the management of MGP-related hazardous waste, which is provided as part of the current administrative record.*

The statement referenced is correct although it should use "waste" rather than "material". The soil can only become a characteristic waste if it is excavated- it is not a characteristic waste in the ground. The second sentence of the referenced paragraph states: "However, if a portion of the soil is removed from the site for treatment, this soil may need to be tested to determine if it exhibits any hazardous waste characteristics." As part of the proposed remedy, hazardous waste characteristic testing is planned for soils excavated for treatment.

6. *Appendix 2-D of the FS presents an analysis of the effect of groundwater mixing with surface water and the potential effects of groundwater discharges on surface water quality. However, there is no discussion on how the predicted surface water concentrations compare to the measured concentrations, and if this comparison supports the mixing ratios proposed by the model. This discussion should be included in the FS. Furthermore, there needs to be additional discussions regarding how these modeled concentrations relate to the groundwater remedial action objectives.*

Limited surface water sampling was available at the time the FS was being prepared, making a comparison of predicted and measured concentrations difficult. Subsequent to the estimates presented in Appendix 2-D, additional Lake Michigan surface water sampling was performed and data was made available to U.S. EPA on November 20, 1998. Ammonia equaled or exceeded the Lake Michigan water quality standard of 20 ug/l in three of 30 lake Michigan nearshore zone samples. A comparison of the mean groundwater ammonia concentration below the beach zone

to the maximum ammonia concentration in the nearshore zone of 70 ug/l results in a dilution of 15,000:1. This is comparable to the modeled dilution, which ranged from 2,900:1 to 22,000:1 (see FS Table 2-D-7). While the near shore zone ammonia data is consistent with the discharge of the ammonia from the plume, other sources of ammonia are present in the area. Ammonia is typically elevated in organic sediments as a result of natural biodegradation. Also discharges of ammonia from other sources such as the North Shore Sanitary District could effect nearshore zone ammonia. As a result U.S. EPA will require additional monitoring of surface water and groundwater as part of the proposed remedy. Revisions to the FS are not necessary because they would not effect remedy development or evaluation.

7. *In Appendix 3-A of the FS, there is a statement made that constraints are in place to prohibit placement of individual water wells, which will eliminate the groundwater ingestion pathway. Under the Illinois TACO regulations, there are specific procedures which must be followed to prohibit the use and installation of potable water wells, including the requirement for the local government to pass an ordinance that meets specific goals set out by the Illinois EPA. The procedures provided in TACO to formally eliminate the groundwater ingestion pathway should be discussed in the FS and incorporated into the Proposed Plan.*

Measures to prohibit installation of potable wells will be a requirement for implementing the institutional controls portion of the remedy. The appropriate process will be followed for the institutional control implementation.

8. *In appendix 4-F of the FS, a cost for an HDPE geomembrane is included in the cost estimate for an asphalt cap. The use of a membrane in conjunction with the asphalt cap is not discussed in detail with the FS. Given the significant cost of the membrane, the use of the membrane with the asphalt cap needs to be justified and discussed in the FS.*

The HDPE geomembrane was included as part of alternative 3 that was one of seven soil media alternatives developed and screened in Section 4 of the FS. The alternative is composed of only an asphalt cap for the entire site. A geomembrane was included in this alternative to increase the reliability of the cap because no other remediation for the soils was included in this early alternative. Note that this alternative was screened out (see FS Table 4-8) and is not the same as the Alternative 3 developed for detailed evaluation. The proposed remedy alternative 3 includes a phytoremediation cap with the potential to convert portions to asphalt cap depending on site development needs. The FS and proposed remedy do not specify the details of a potential asphalt cap.

9. *In appendix 5-A of the FS, there is a discussion that transportation of PAH-impacted soils to the Illinois Power facility near St. Louis, Mo would be less complicated if trucks were used as opposed to a barge. The cost estimates presented in the FS apparently use costs for trucking the soils to Illinois Power. Given the relatively large volume of soil and the accessibility of water and rail transportation, the cost to transport the impacted soils via barge or rail should be considered in the FS.*

The transportation method for getting the soil to the treatment facility is not specified in the proposed plan and will be determined during remedial design. FSs need not determine all the details of the design, but rather must provide a representative option for such items as transport method.

10. *As discussed in the "1998 Waukegan Harbor and Lake Michigan Surface Water Sampling, Waukegan Manufactured Gas and Coke Plant Site" Work Plan, the field parameters of pH, conductivity and temperature are to be recorded every 5 minutes after a stable pumping rate is established. Once three consecutive readings and 30 gallons of water have been purged, the surface water sample may be collected. Documentation of the field parameter measurements needs to be provided in the FS, and compliance with the requirements of the Surface Water Sampling Work Plan needs to be discussed.*

U.S. EPA has not required that all the details of post RI sampling be documented in published reports. If U.S. EPA has reason to believe that sampling methodology has caused inaccuracies in results, the documentation is requested. U.S. EPA has no reason to believe that the surface water samples have been collected inappropriately.

11. *A spot check of field parameters associated with the July 7, 1996 groundwater sampling event indicated that approximately 37% of the monitoring wells had not stabilized at the time of sampling. The criteria used to verify stabilization is outlined in the July 1, 1991 Sampling and Analysis Plan". An explanation needs to be provided in the FS as to why monitoring wells were not allowed to stabilize in all cases.*

It is unclear as to which data this comment is referring. The FS presents groundwater sampling data for July 17, 1996, but there are no sample results for a date of July 7, 1996. Assuming that the comment meant to refer to July 17,1996 groundwater sampling, field parameter results are presented on Table 2-2 of the FS. However these are sampling results, not results taken during purging of the well for determining when the well water has stabilized.

12. *Groundwater and surface water sampling was conducted by Bar engineering during the time period July 15 through 19, 1996 and documented in a sampling report dated August 9, 1996. A comment in the "Waukegan Sampling Notes" references a soil sample collected 200 feet east of monitoring well nest MW-13. The soil sample was obtained by excavating down to the water table and collecting six 8- oz. containers filled with water saturated soils. In addition, the note states that the samples were sent to GTI. Based on review of the procedures in GTI's treatability study, no site soils were specifically identified. These soils do not represent aquifer conditions in the region of the groundwater impacts. The use of these soils and associated analysis need to be discussed in the FS.*

The area east of MW-13 is on the beach in the area of the concentrated portion of the groundwater plume. Two hundred feet east of MW-13 is SB-63 where groundwater grab samples contained the following levels of contaminants: ammonia - 1,060 mg/l, phenol - 430 mg/l and arsenic - 50.8 mg/l. It is clear that the referenced soil sample was collected from the region of

groundwater impacts.

13. *The human health risk assessment was developed using a screening approach to identify constituents of potential concern (COPCs). The COPCs were selected if the individual constituent excess risk exceeded 10^{-6} or that the non-cancer risk contributed 1 percent of the total risk. The risk assessment then evaluated potential exposures and risks to constituents exceeding the screening levels. This approach would be acceptable except that in the FS, the target risk levels for individual constituents were set at 10^{-6} or 10^{-5} and the cumulative risk could exceed the target level. As a result, the screening procedure in the risk assessment should have been reviewed to ensure that all constituents with screening levels of 10^{-7} or higher were considered in developing the soil cleanup levels. Under the Illinois TACO regulations, the acceptable risk level is 10^{-6} under Tiers 1 and 2, with some flexibility for acceptable risk under Tier 3. Following the Illinois regulations, justification for the higher target risk level should be provided. This was not done in the FS. Additionally the Illinois regulations require that the target risk level be met at the exposure point. This would imply that this would be a cumulative risk rather than the individual constituent risk. Therefore, the FS should be revised to indicate that the risks fall within an acceptable risk range that will meet all appropriate ARARs.*

The methodology used in the screening of chemicals to identify COPCs is the standard method in the U.S. EPA Risk Assessment Guidance Manual. The target risk levels for individual constituents that were set at 10^{-5} risk levels define the areas for active remediation. These areas were identified through a combination of contaminant mass versus volume and risk levels as discussed in the FS Section 4.3.1.3. Contamination remaining following excavation and treatment of the soils would pose a risk of less than 10^{-5} for individual constituents and is expected to be below 10^{-4} cumulative risk. Because the entire site is to be covered with the phytoremediation cover, exposures to site soils are prevented and the public is protected to below 10^{-6} cumulative risk.

14. *Groundwater data have been collected since the risk assessment was prepared in 1995. The data used in the risk assessment should be compared with the more recent data to ensure that conditions at the site are accurately characterized. It is possible that conditions at the site have improved over time and that the risks identified in the risk assessment overestimate actual or hypothetical risks at the site. Thus a discussion needs to be provided in the FS that documents that the risk assessment inputs have not changed sufficiently to require calculating site risks.*

Additional data has been collected since the RI for groundwater. The risk assessment found the groundwater to be acutely lethal. Arsenic levels have not shown consistent trends since the RI to this assessment. Because there is no change in the risk assessment conclusions, the FS does not require modification.

15. *The FS develops target cleanup levels for three scenarios: reasonable maximum (RME), central tendency (CTE), and representative high exposure (RHE). In each case the exposure assumptions are developed based on a combination of U.S. EPA default assumptions and*

professional judgment. The RHE does not appear to be a scenario that is outlined in either U.S. EPA guidance or Illinois regulations. The RHE case appears to be the preferred approach for developing cleanup levels in the FS. The exposure assumptions used in this scenario are a combination of conservative and realistic assumptions. Because the assumptions are different and the target risk level greater, the cleanup levels developed for the RHE tend to be higher than those corresponding to the other scenarios. The use of the RHE may also result in cleanup levels exceeding the Illinois EPA acceptable risk level when considering additive effects from exposure to different constituents (see above). Justification for the use of RHE and its underlying assumptions needs to be presented in the FS.

The justification for use of RHE is presented in the FS section 3.2 and Appendix 3-B. As discussed under the response to comment 13, the target risk levels for individual constituents that were set at 10^{-5} risk levels define the areas for active remediation. Contamination remaining following excavation and treatment of the soils would pose a risk of less than 10^{-5} for individual constituents and is expected to be below 10^{-4} cumulative risk, if exposures were to occur. Because the entire site is to be covered with the phytoremediation cover, exposures to site soils are prevented and the public is protected to below 10^{-6} cumulative risk.

16. *Arsenic toxicity to wildlife is dependent on its form. The risk assessment indicated that only 20 percent of the total arsenic at the site was likely present in the inorganic form. Without presenting information on the source of the arsenic, this conclusion may be erroneous. Some data were available indicating that arsenic was present more in the pentavalent form. The possible impacts of arsenic on ecological receptors should be reevaluated in the FS to more clearly account for arsenic's form in the environment.*

See the above response to comment 5 of the OMC Comments in Attachment A to Letter Dated April 23, 1999, (attachment A, pg. 12, par. 1). Also, the assumption of 20% inorganic arsenic was only made for the human health fish ingestion pathways. The ecological risk assessment assumed all the arsenic was the more toxic inorganic form.

17. *The risk assessment performed for the site needs to be revised to consider a possible residential redevelopment (see discussion under "Redevelopment Issues" above).*

A residential land use scenario was evaluated in the risk assessment. As discussed under the Response to OMC Attachment A Comment 2, the FS reevaluated future land use and found that industrial land use was the most likely future use of the site.

18. *Appendix 3-B of the FS discusses the development of target soil concentrations protective of human health. Throughout this discussion, there is reference to Illinois EPA guidance, and a specific statement that the Illinois guidance provides a cancer target risk value of one excess cancer in one-hundred thousand over background risk level for the cancer endpoint. The specific Illinois/IEPA guidance should be referenced (if the TACO regulations are being referenced, these are regulations, not guidance), and the use of 10^{-5} excess cancer risk by the State of Illinois needs to be better substantiated.*

Appendix 3-B references U.S. EPA guidance extensively in the development of target soil concentrations. The single reference to State of Illinois guidance appears on page 3-B-6. The lack of a specific reference for the statement that Illinois guidance uses 10^{-5} is not central to the development of TSCs because U.S. EPA requires that the risk range from 10^{-4} to 10^{-6} be considered.

19. *Appendix 4-A of the Feasibility Study provides a preliminary evaluation of the effectiveness of the proposed vadose zone soil remediation. Throughout this discussion, there is reference to a 10^{-4} RHE soil risk levels. However, in Appendix 3-A, a 10^{-5} excess cancer risk appears to be used. This discrepancy needs to be explained.*

As discussed on the FS pg. 4-A-1, the objective of the appendix was to present a methodology for soil confirmation sampling and an estimate of the residual risk posed after excavation of the target soil areas. The excess cancer risk level of 10^{-4} discussed is for the commercial/industrial exposure setting, while the areas targeted for remediation are based on a 10^{-5} utility/construction worker exposure setting.